Zero Retries issue 0186 2025-01-24

Zero Retries is an independent newsletter promoting technological innovation that is occurring in Amateur Radio, and Amateur Radio as (literally) a license to experiment with and learn about radio technology. Radios are computers - with antennas! Now in its fourth year of publication, with 2400+ subscribers.

About Zero Retries

Steve Stroh N8GNJ, Editor

Jack Stroh, Late Night Assistant Editor Emeritus

Web version of this issue - https://www.zeroretries.org/p/zero-retries-0186

In this issue:

- **Request To Send**
  - Paid Subscribers Update
  - Upcoming Events Countdown
  - Personal Perspective about my Enthusiasm for the IP400 Network Project
  - New Zero Retries Boilerplate Page
  - Canadian Innovation in Amateur Radio Data Communications
  - In Search of AMRAD Members (Current and Former)
  - Thought Experiment - Integrating Personal Radio Science Projects
  - Thought Experiment - Adaptive Repeater Behavior During VHF / UHF Extended Propagation
  - Recent Presentation - Tracking Technological Innovation in Amateur Radio - Zero Retries Newsletter
- **Brief Update on the IP400 Network Project**
- **IP400 Network Project Frequently Asked Questions v1.0**
- **ZR > BEACON**
  - M17 texting with a Nokia 3310
  - Tweets from Space
  - CaribouLite SDR HAT for SDR on a Raspberry Pi
- **Zero Retries Boilerplate**
- **Footnotes for this Issue**
- **Comments for This Issue** (redirect to Comments page)

Request To Send

Commentary by Editor Steve Stroh N8GNJ

Paid Subscribers Update

My thanks to **Paul Campbell KE7YK** for *upgrading* from a free subscriber to Zero Retries to an **Annual Paid Subscriber** this past week!

My thanks to **Prefers to Remain Anonymous 63** for becoming an **Annual Paid Subscriber** to Zero Retries this past week!

My thanks to **Prefers To Remain Anonymous 20** for one year of being a **Paid Subscriber** to Zero Retries as of this past week!

My thanks to **Prefers to Remain Anonymous 64** for becoming a **Paid Subscriber** to Zero Retries this past week!

Financial support from Zero Retries readers is a significant vote of support for the continued publication of Zero Retries.

Upcoming Events Countdown

- **Utah Digital Communications Conference**, 2025-02-22 in Sandy, Utah, USA in ***4 weeks.*** The *Call For Presenters* for this conference is still open.

- **HamSCI 2025**, 2025-03-14 and 15 in Newark, New Jersey, USA in ***8 weeks***. Tina KD7WSF and I will attend this event. I hope to meet up with any Zero Retries readers that are also attending HamSCI 2025 to talk about all things Zero Retries Interesting.
- **Southeastern VHF Conference 2025**, 2025-04 and 05 in Clarksville, Tennessee, USA in ***10 weeks***. More details in an email list message.
- **Four Days In May 2025** - 2025-05-15 in Fairborn, Ohio USA (in conjunction with Hamvention 2025).

Personal Perspective about my Enthusiasm for the IP400 Network Project

Both "major" articles in this issue are about IP400. The subject has admittedly consumed me somewhat of late. Thus I think the following is instructive.

In a discussion this week with Martin Adcock VE6VH this week about a relatively minor difference of perspective, I made what was, at that moment, an offhand remark:

> I've made more progress on this idea in the past month with you than evangelizing it for a decade or so.

I thought I'd expand that offhand remark here in Zero Retries as I think it offers some perspective on the significance of the IP400 Network Project. The evangelizing I was referring to was:

- The need (and market opening) for a true VHF / UHF radio purpose built for data communications, as in a "black box" much like the lamented UDRX-440.
- My "fantasy specification" for such a radio eventually morphed into that radio being a full Software Defined Radio - any radio modulation, any mode, any protocol - "just a simple matter of software".1
- Most Amateur Radio VHF / UHF repeaters were becoming increasingly unused, and that adapting repeaters for data would simultaneously "give the silent repeaters something to do" and encourage the growth of (next generation) Amateur Radio data communications.
- My perspective on repeaters adding data capability was partially enabled by learning about the capabilities of Multi Mode Digital Voice Modem (MMDVM) and that MMDVM was originally created to adapt FM repeaters to handle digital voice modes. MMDVM also includes some data capability. I got really excited about the potential of "MMDVM repeater upgrades" when I learned about the MMDVM-TNC project which can be used on any current MMDVM hardware. While MMDVM-TNC is a very promising data mode, it remains a project in progress that may, or may not, be continued to completion.

I've approached a major Amateur Radio manufacturer… and though my idea was politely received in person, it was obvious that my suggestion was summarily dismissed. Other than the attempt at the UDRX-440 and an apparently unrealized project in Austria related to my radio idea(s), and the Mount Diablo Amateur Radio Club's *admirable* W6CX-DV MultiMode Digital Voice Repeater (implemented an MMDVM), I've gotten no takers for these ideas.

Until that fateful email less than a month ago from VE6VH who embraced both the need for a new data radio, and the idea of adapting FM repeaters for data capability… *and had the technical capabilities to create such technology*.

*So… yeah, I **am** a bit giddy* about the possibilities arising out of the IP400 Network Project for an entirely new generation of Amateur Radio data communications capability. If VE6VH and I can realize our joint vision for the IP400 Network Project, it will be capable enough *and interesting enough* to attract new people into Amateur Radio to be able to use IP400 networks.

New Zero Retries Boilerplate Page

It didn't help much this week. 😀

It was pointed out by a trusted advisor to Zero Retries that the "boilerplate text" at the end of every issue consumes considerable space in what is intended to be an *email* newsletter. That info, which includes acknowledgements and useful and relevant information (particularly to new readers of Zero Retries) doesn't change much from issue to issue. Thus it's appropriate to consolidate that info to a static web page and free up the space in Zero Retries for actual *news* in this *email* newsletter. Doing so also has the advantage of readers of older issues can find *current* information by going to that page, which will be periodically updated.

The one section I decided to retain in every issue of Zero Retries (to continue a promise) was to mention the Zero Retries Founding Members in every issue of Zero Retries as a small Thanks to them.

Thus, as of this issue, see the **Zero Retries Boilerplate Text** page for significant acknowledgements and other information relevant to Zero Retries. That info is particularly recommended for new readers of Zero Retries.

I'll mention when there's a significant update of the Boilerplate Text.

Canadian Innovation in Amateur Radio Data Communications

In working with Martin Alcock VE6VH on the IP400 Project, it struck me that modern Amateur Radio data communications, begun in Canada2, has come full circle.

This following is a very terse, incomplete history mostly from my memory and a little bit of research in VADCG's "the packet" newsletter. *Thank you, Thank you DLARC for bringing "**the packet**" online, out of the depths of obscurity!*

- I don't know any details, but doing modern (more advanced than Radio Teletype - RTTY) data communications in Amateur Radio (such as using ASCII), was legal in Canada before it was legal in the US.
- Canada pioneered a "digital" Amateur Radio license, where most of the questions on the examination were about digital / data communications

rather than the usual radio and electronics theory questions.

- Amateur Radio Packet Radio was first developed in Montreal, Quebec in 1978 by members of the Montreal Amateur Radio Club, with the Montreal Protocol. That early Amateur Radio Packet Radio technology became the basis of Dataradio Corporation.
- Amateur Radio Packet Radio was made usable for average experimenters with the creation of the Vancouver Amateur Digital Communications Group (VADCG) TNC as a kit in Vancouver, British Columbia. VADCG also pioneered the "Vancouver" and V-23 packet radio protocols which predated the AX.25 packet radio protocol which was originally developed by AMRAD (see article below).
- Packet Radio networks were first connected via satellite (ANIK-8) between Vancouver, BC and Ottawa, ON. If memory serves, this link became known as "the wormhole".
- Hamilton Area Packet Network (HAPN) in Hamilton, Ontario developed an innovative HAPN 4800 bps modem on a IBM PC/XT expansion slot card. Again if memory serves, the use of this modem was usable on a much larger range of radios with minor modifications than the 9600 bps Frequency Shift Keying (FSK) mode which required bypassing a radio's pre-emphasis and de-emphasis stages (flat audio).
- In addition to the work being done in Vancouver and Montreal, there was pioneering packet radio radio development done in Ottawa, Ontario, including the creation of the Ottawa Packet Interface (PI) on a IBM PC/XT expansion slot card that was the only practical interface between a PC and the WA4DSY 56k radio modem.

And now IP400 being developed in Calgary, Alberta.

In Search of AMRAD Members (Current and Former)

In researching the above article, I ran across a mention of AMRAD in "the packet", the newsletter of the Vancouver Amateur Digital Communications Group (VADCG), Issue 7, September 1982, Page 4:

> Dear Readers of The Packet,
>
> Greetings from AMRAD, a group of over 588 Amateur Radio and personal computer experimenters. For well over two years now, packet radio has been our most active project. We have been in close touch with VADCG, other packet groups and the American Radio Relay League to cooperate on the development of packet radio.
>
> Our monthly AMRAD Newsletter is largely devoted to packet radio. We have a regular "Protocol" column authored by Dave Borden, K8MMO since February 1988. In addition, there have been a number of other articles about packet radio nearly every month. We recently concluded a series of articles by Jerome Dijak, W9JD on hf tests of the W9JD forward-error-control (FEC) automatic-request (ARQ) system.
>
> …
>
> 73, Paul L. Rinaldo, W4RI

AMRAD - the Amateur Radio Research and Development Corporation in McLean, Virginia, USA (Washington DC area) was a pioneer of (then) bleeding edge aspects of Amateur Radio beginning in 1972. AMRAD's projects included satellites (back when satellites were *really* hard and *really* expensive), Packet Radio, Digital Signal Processing, Spread Spectrum… all subjects that I try to cover in Zero Retries.

"I've heard stories" that some of the best and the brightest technical minds at various US government agencies had fun exercising their technical expertise on various AMRAD projects. Just *one* example of some of the "colorful" AMRAD folks was Andre Kesteloot N4ICK.

Thus it would be… *wonderful*… if the *entire* archives of the AMRAD Newsletter could be available to inspire future Research and Development work in Amateur Radio in the Digital Library of Amateur Radio & Communications (DLARC). I donated the few issues of the AMRAD Newsletter that I had to DLARC and they are now online. But those eleven issues are a *tiny* smattering of the AMRAD Newsletter which was published at least through 2018.

My request to you nearly 2500 Zero Readers:

1. If you have an archive of paper or electronic copies of the AMRAD Newsletter and are willing to donate them to DLARC, or
2. If you know of a good person to get in touch that is with currently involved with AMRAD who might facilitate a donation of AMRAD Newsletter archives,
3. Please get in touch with Kay Savetz K6KJN - kay@archive.org who is the Archivist in charge of Digital Library of Amateur Radio & Communications (DLARC) project of Internet Archive.

I can guarantee from personal experience that such a contribution would be handled well and very cooperatively.

Thought Experiment - Integrating Personal Radio Science Projects

I was interested to read about the HamSCI Personal Space Weather Station (PSWS):

> The Personal Space Weather Station project goal is the creation of a geographically distributed, multi-instrument system capable of making ground-based measurements of the space environment. The observations from this project will be useful to the owner of each system, but, more importantly, they will be aggregated into a central database for space science and space weather research purposes. The systems are designed to be relatively low cost (between 100 and 1000 US dollars), easily constructed and deployed by science professionals, educational institutions and citizen scientists.

The most unusual instrument in a PSWS is a ground magnetometer.

It surprised me that PSWS doesn't make any provisions for monitoring radio frequency spectrum above the HF band (30 MHz), and I think there's

significant value of observing / documenting / recording in real time extended propagation in the VHF / UHF bands… aka, when "skip" is occurring. See next article about why that's relevant.

At that point it occurred to me that there may be an opening for some organization, or just a group of organizations to begin cooperating, to help individual experimenters to integrate various "radio science" activities beyond PSWS for them to be better able to contribute to science and "the non-professional radio community". Systems I have in mind for such integration include:

- WSPR transmitting and receiving?
- Reverse Beacon Network?
- VHF / UHF beacon transmitter and receivers?
- Online HF / VHF / UHF web receivers such as KiwiSDR?
- Weather data transmitted by individual APRS stations (or just injected into APRSIS)?
- SatNOGS and TinyGS receive-only satellite ground stations to receive data from experimental research satellites in low earth orbit?
- Personal sky cameras?
- Experimenter's high altitude balloon tracking?
- Meteor scatter propagation occurring (affects the ionosphere)?

All of these can be done standalone, or combined, but it would seem like there's some synergy to be had to cross-evangelize these (admittedly loosely) related "radio science" projects.

Thought Experiment - Adaptive Repeater Behavior During VHF / UHF Extended Propagation

As I wrote the above article, mentioning in passing VHF / UHF beacon transmitting and receiving, it occurred to me that one advancement that could be integrated into an IP400 Network Project repeater is "adaptive behavior". When there are extended propagation openings on VHF / UHF, if a repeater "knew" that an extended propagation opening was occurring (such as tropospheric ducting), the repeater could proactively change its operating characteristics in anticipation that co-channeled repeaters (and user transmissions) from outside the repeater's normal operations area could cause interference.

Such adaptive behavior could include:

- Lowering the transmit power of the repeater,
- Tighten the repeater receiver's sensitivity or squelch to "extra tight",
- Notification (via telemetry) to the repeater trustee that adaptive behavior is in effect,
- Increase the degree of Forward Error Correction for digital / data transmissions,
- Alter the sensitivity of remote receivers to favor receivers that are less susceptible to extended propagation (they're located in a shielded location such as a valley).

This idea is inspired by the memory of a frustration with packet radio networking using the Net/ROM mesh network system in the Seattle area. Net/ROM was replacement "node" networking firmware for TNC-2 units. Thus there was only so much program space (32 kB), only so much RAM (32 kB), and comparatively little processor power (Z80 at 1 or 2 MHz).

Net/ROM did a great job at discovering when new nodes came on the air - auto discovery and automatic routing[4]. The problem arose when extended propagation occurred - Net/ROM would add a "new node" based on its auto discovery mechanism, and then the new node would "disappear" (the extended propagation faded) but Net/ROM would keep trying to access the new node until it eventually aged out. But during the time the "phantom node" was in the routing table, network performance suffered.

There was one memorable "phantom node" that would appear in the Seattle area Net/ROM nodes very regularly, *just long enough* for auto discovery to see it at sunrise, or sunset causing changes in propagation either across Puget Sound, or the Cascade Mountains.

Net/ROM did have the ability for network managers to "lock out" problem neighbor nodes (only a few - RAM was tight), but then you were placed in the position of micromanaging the routing table which negated the utility of auto discovery and auto routing.

Again, this is solely a thought experiment. Monitoring for distant VHF / UHF beacons is no longer expensive or complex - VHF / UHF receivers are easy to implement in this era. In the IP400 Network Project, we have the ability to rethink old paradigms and tackle old problems, such as adaptive behavior based on inputs that weren't practical to consider in previous eras with the technology of those eras.

Recent Presentation - Tracking Technological Innovation in Amateur Radio - Zero Retries Newsletter

On 2024-11-09, I did a presentation to the Puget Sound Repeater Group for their Educational Meeting (they've had some previous Zero Retries Interesting presentations). My presentation is was recently posted on YouTube, as well as the slide deck for that presentation.

As always, the goal of my presentations isn't to overtly promote Zero Retries, but rather to highlight *just how much technological innovation is actually happening* in Amateur Radio… that most Amateur Radio media isn't mentioning and thus most Amateur Radio Operators aren't aware of. We (Amateur Radio, collectively) have a lot to be proud of and should be promoting more aggressively.

I'm available to do presentations at club meetings or other gatherings on this topic.

Have a great weekend, all of you co-conspirators in Zero Retries Interesting Amateur Radio activities!

Steve N8GNJ

Leave a comment

Share

Brief Update on the IP400 *Network* Project

By Steve Stroh N8GNJ

It's only been a week since the announcement of the IP400 Network Project, and there are already a few developments to report.

Minor Name Change

The name has changed slightly to the IP400 *Network* Project. That's to reflect that the goal of the project isn't just on standalone hardware, or a specific radio. The IP400 Network Project's goals include not only highly capable, flexible, and adaptable hardware (radios, repeater controllers) but to create a new *network* capability for Amateur Radio.

Pi Zero HAT Radio

One of the most interesting developments is that on the IP400 page, Martin Alcock VE6VH has unveiled a rendering of the **Pi Zero HAT Radio**.

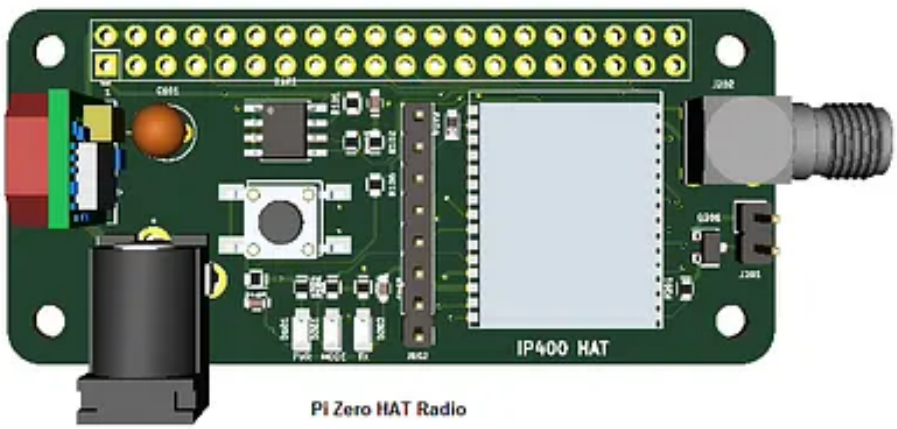

Image courtesy of Alberta Digital Radio Communications Society

A few notes about this unit:

- Yes, it's designed to work with the Raspberry Pi Zero units. It's to be determined whether the original Raspberry Pi Zero will be usable, or the features will require the newer, more capable Raspberry Pi Zero 2 W. The difference in cost is negligible, thus I'd opt for the latter unit and get the benefit of of the wireless capability.
- The barrel power connector is a 12 volt input. That provides power for the radio and powers the Raspberry Pi, thus no need for a fussy Micro USB power connector and power supply.
- The connector in the middle of the board is for an STLINK debugger probe. The two-pin connector next to the antenna connector is for keying an external power amplifier to reduce latency that would be added if the amplifier was using transmit sensing.

Thus you get a sense of how practical this first hardware of the IP400 Network Project is given that the radio is a highly integrated chipset, the computing is done by an off the shelf Raspberry Pi computer, and the rest of the board is mostly basic interface electronic components. The rest, as they say, is *software*.

Nice Mention of IP400 Network Project on Amateur Radio Daily

IP400 Network Project Announced

> January 19, 2025
>
> Designed by Martin Alcock (VE6VH) with support from the Alberta Digital Radio Communications Society (ADRCS), the IP400 Network Project is designed to enhance amateur radio repeaters. IP400 aims to bring digital voice modes, data transfers, messaging, and a data

> networking layer that links repeaters together via RF.
>
> The latest issue of Zero Retries features in-depth write-ups of IP400, including a message from VE6VH outlining the history and vision of the project.

I was told this story will also run in this week's Amateur Radio Weekly.

IP400 Email List

The ip400 email list is active with 42 subscribers after one week. We'll soon transition this email list from the free tier to the paid tier to take advantage of additional groups.io features such as polls, subgroups (highly useful for beta testing and software development), and a wiki (quick, easy documentation in lieu of maintaining a formal document with incremental changes).

IP400 Protocol v0.4

The IP400 Protocol Specification has advanced from v0.3 to ***v0.4***, available on the Public IP400 Github repo.

Financial Support for IP400

The IP400 Network Project development is financially and organizationally supported by the **Alberta Digital Radio Communications Society (ADRCS)**. If you would like to financially support the development work of the IP400 Network Project (or are in the Alberta / Pacific Northwest region and want to support the ADRCS Network), go to https://adrcs.org/adrcs/ and click the **Join** button in the upper right corner of the page, which then redirects to:

> Thank you for considering a membership, which gives you access to online services on the AREDN network, and access to development projects in progress.
>
> Membership dues are $25.00 CAD per year, or approximately $17.50 USD.
>
> Please fill in the form below, and press 'Submit', then you will be redirected to pay securely using Paypal.

There is currently only the one "tier" of support / membership.

Joining ADRCS with a paid membership is a significant show of support for the development of the IP400 Network Project.

IP400 Network Project Frequently Asked Questions v1.0

By Steve Stroh N8GNJ

Q. What is the IP400 Network Project? The Elevator Pitch?

A. The IP400 Network Project is a system of Software Defined Radios designed for faster data modes such as 500 kbps (minimum) on VHF / UHF bands. Later, more capable IP400 radios will *also* be capable of being software defined. With those later IP400 radios, to do DMR, FreeDV using SSB. fast data, digital television, etc. merely requires loading the software for that mode. An IP400 repeater controller to "retrofit" FM repeaters for IP400 compatibility is planned.

*Q: Meaning of **IP**?*

A. **I**ntelligent **P**rotocol is being developed to take full advantage of this new generation of radio hardware for faster Amateur Radio data communications.

*Q. Meaning of **400**?*

A. The first several IP400 radios planned will be for the "**400**" MHz Amateur Radio bands. In the US - 420-450 MHz, Canada 430-450 MHz, Europe, 430-440 MHz, etc. The choice of this band is a limitation of radio chipsets that were chosen for *initial, rapid, cost-effective development* of IP400 radios. The long term goal is to offer IP400 radios for all Amateur Radio VHF / UHF bands, which will require additional development to use different radio chipsets.

Q. Why / how is this different from other Amateur Radio VHF / UHF radio projects?

A. IP400 radios use radio chipsets that are optimized for *data* (and reasonably fast data - the goal is 500 kbps minimum).

Q. How is this different from a Software Defined VHF / UHF Transceiver like the LimeSDR Mini 2.0?

A1. IP400 radios are designed for *Amateur Radio* use by Amateur Radio *Operators* for the *Amateur Radio VHF / UHF bands* for reasonably fast data communications. It's planned that later versions of IP400 radios will have an integral power amplifier at typical Amateur Radio power levels - 10 / 25 / 50 watts. Also in those later IP400 radios, software / modes will be simple to use - select the radio type / mode from a menu.

Software Defined Transceivers such as the LimeSDR Mini 2.0 are general purpose devices that operate over a very wide frequency range with very low transmit power. Typically the very complex GNU Radio software is required to make use of such units.

A2. Later, more capable IP400 radios will, similar to the LimeSDR Mini 2.0, be a fully software defined transceiver using an I+Q interface coupled with a Field Programmable Gate Array (FPGA) and a host computer. For such use, it's expected that software developers will port radio / mode applications such as DMR, 9600 bps FSK packet radio, and almost any other voice or data mode to run on IP400 radios.

Of course, it's hoped that someone will develop a driver to port GNU Radio to the later, more capable IP400 radios so that GNU Radio software modules can be used on IP400 radios (within the limitations of the radio chipset).

*Q. **Network** Project?*

A1. There are multiple networking options within IP400. An inspiration, and an interoperability goal, is AREDN which has implemented a usable, auto discovery, dynamic mesh network. Each IP400 radio will be capable of mesh networking with other IP400 radios.

A2. If an IP400 repeater is available, IP400 radios can communicate via the IP400 repeater at high speed using the IP400 network protocol (typical repeater operation).

A3. IP400 repeaters can link together via an IP400 inter-repeater *radio* link. IP400 repeater linking replaces typical repeater linking, either analog or AllStarLink or Internet, which is typically only capable of *voice* linking.

Note that development of the IP400 repeater controller is dependent on receiving grant funding for development.

A5. IP400 radios will support AX.25 networking using encapsulation. An IP400 radio's host computer can run an AX.25 stack, the IP400 protocol will encapsulate AX.25 packets, through the IP400 network, to the destination IP400 radio, which will unpack the AX.25 packets and pass them to that host computer's AX.25 stack.

A6. IP400 radios will also support TCP/IP, initially IPv4 (mature in a number of software stacks) and eventually IPv6 (later development).

Q. Can IP400 radios do voice?

A1. Yes. It's intended that the IP400 "native" voice mode will be M17 which is open source, so "easily" ported to IP400 radios. In the later, more capable IP400 radios, other voice modes can be used by loading applicable software such as DMR, FM, SSB, etc.

A2. In IP400 radios communicating with other IP400 radios, voice will be just one realtime bitstream of many potential realtime bitstreams including video, high priority telemetry, command and control, etc.

Q. Open Source?

A. Software, protocol, etc. will be open source..

Q. When?

A. The initial IP400 radio will be available in 2025.

If grant funding is received, more capable IP400 radios, and a repeater controller, will be developed.

Q. Price?

A. *There be dragons!* Many Amateur Radio projects have floundered or been attacked for prematurely mis-estimating what turned out to be a higher actual price. Realistic price estimates will be released when the project has progressed for at least a few months.

Q. Why use a Raspberry Pi as the host computer?

A. Raspberry Pi computers work well, are reasonable priced, they're (once again) widely available (worldwide), they're incredibly well supported by the Raspberry Pi Foundation. Raspberry Pi computers (and modules) are generally the least hassle / most common host computer available for dedicated applications in Amateur Radio. All other platforms have varying degrees of available, support, cost, etc.

Especially in the later, more capable IP400 radios, to maintain high performance / high speed, the radio | FPGA | host computer connectivity must be high performance and low latency (in comparison to a more typical USB interface to a PC, etc.) With the emergence of the Raspberry Pi 5 with a quad-core Arm Cortex A76 processor @ 2.4GHz, up to 16 GB of RAM, and high speed storage via PCIe, compute power for an IP400 radio won't be an issue. There's even the possibility of using an embedded Raspberry Pi 5 Compute Module for even better integration, higher performance, and cost-effectiveness.

Another recommendation for the Raspberry Pi 5 is native video capabilities - it has an input for an inexpensive camera, and native H.264 video decoding. And, no hassles with adding Wi-Fi or Bluetooth - that's also built in. *And* the RPi 5 has a built in real time clock! Those are all features "included for free" when a Raspberry Pi (5) is used as a IP400 radio's host computer, that the IP400 Network Project *doesn't* have to engineer or create drivers for.

Q. How can I play along?

A1. Steve Stroh N8GNJ will be reporting regularly about IP400 Network Project developments in his weekly Zero Retries newsletter.

A2. For developers, check out the IP400 Public GitHub Repo.

A3. For general conversation, join the IP400 Network Project email list.

A4. Prototype development (2025-01) is being done with a NUCLEO-WL33CC2 (radio) development board. See this email list posting for details. Note that the prototype work is different hardware than the initial IP400 radio.

Q. How can I support the IP400 Network Project?

A. Development of the IP400 Network Project is financially and organizationally supported by the **Alberta Digital Radio Communications Society (ADRCS)**. Go to https://adrcs.org/adrcs/ and click the **Join** button in the upper right corner of the page to become a paid member of ADRCS.

Q. How can I arrange for an interview for an article, podcast, YouTube video, etc.?

A. Fill out the ADRCS Contact Form.

Leave a comment

Share

ZR > BEACON

By Steve Stroh N8GNJ

Short mentions of Zero Retries Interesting items.

M17 texting with a Nokia 3310

Wojciech “Woj” Kaczmarski SP5WWP on the new M17 Project website:

> **Is M17 any better than DMR?**
>
> One of the first M17 transmissions using a modified Nokia 3310/3330. Not too complicated using libm17. There’s a wiki article on how to generate M17 baseband with the library.

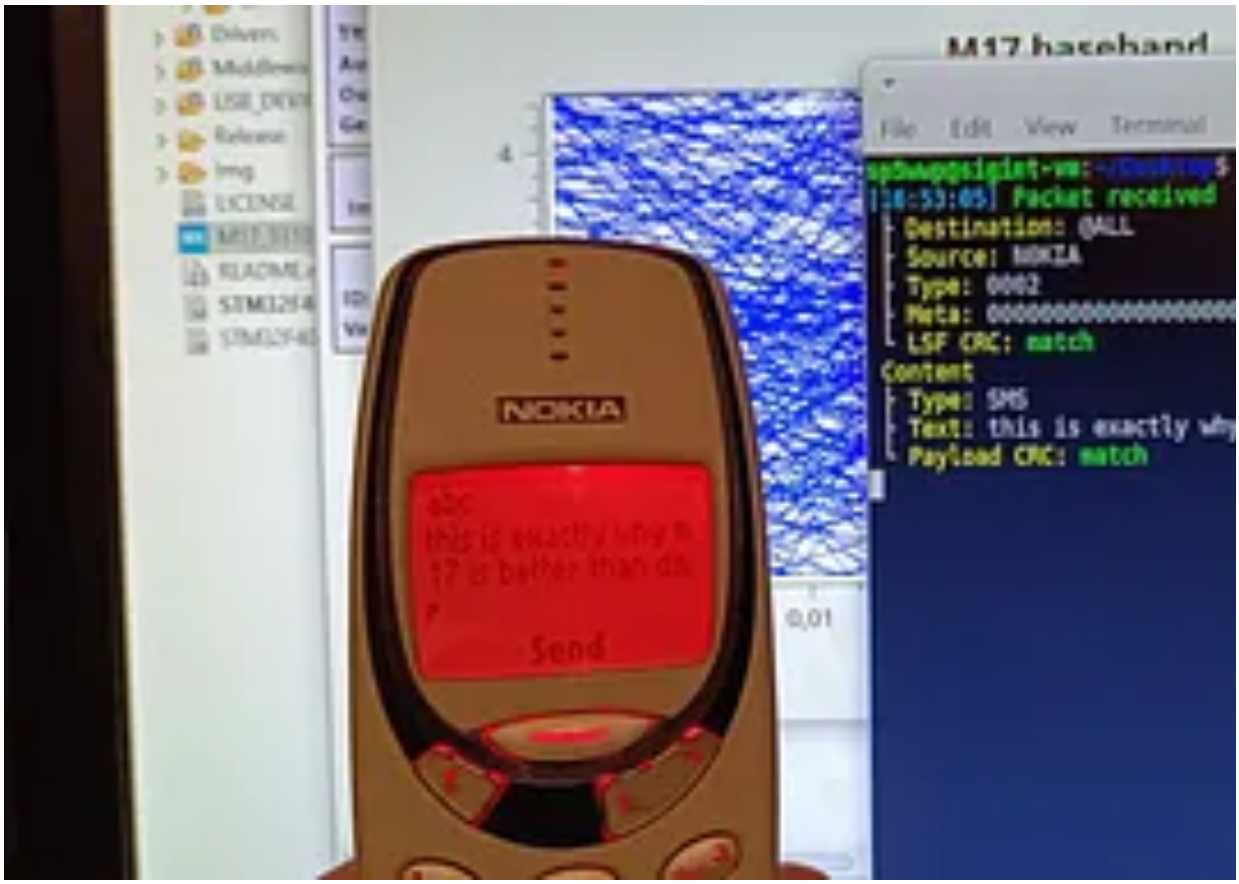

Image courtesy of M17 Project / Wojciech Kaczmarski SP5WWP

> The transmission was received with an RTL-SDRv3 on 433.475MHz – IARU R1 designated M17 calling frequency! 🙂

In a followup email, SP5WWP added some detail:

> I can enter arbitrary text using either "naïve/slow" or T9 entry method (with an English dictionary of over 3,000 basic words, stored in the MCU) and send it over M17 packet mode (exactly as described by the spec). I'm using libm17, it makes the task super easy. The whole code is on GitHub, as always. The RF module used is SA868S, UHF, running OpenRTX. I used the original phone's antenna.

In a followup to the followup email, SP5WWP also mentioned an article on the M17 Foundation’s new Wiki:

> **Receiving M17**
>
> **Receiving M17** doesn't require any exceptional or expensive hardware. This article demonstrates how to receive and decode M17 using inexpensive SDRs.
>
> **Receiving M17 texts**
>
> To receive M17 text messages, you will need:
>
> - an SDR receiver: an RTL-SDRv3 would do great, other revisions are fine too

- a PC running Linux with installed GNU Radio
- a tiny bit of patience and will

GNU Radio installation is not covered by this article.

…

The capabilities and flexibility and extensibility of M17 continually impresses me. *There is little equivalent happening* with most other "commonly used modes" because they're either (mostly) proprietary and thus static, or their development / developers just seem "tired". *Why innovate? We like it as is*.

M17 by comparison is vibrant and interesting. There's been a pause in news about M17 because of the new M17 Foundation having only recently been formalized, and a new M17 Project page, and Wiki, having to be recreated. In the near future I'll be helping to write news blurbs for the M17 Foundation website and evangelize M17.

Tweets from Space

Bennett Z. Kobb AK4AV in **Experimental Radio News 11**:

> SilverSat Ltd. was issued WP2XGW for its 437.175 MHz Amateur Radio satellite, being readied for launch in June 2025. SilverSat is a "multi-year, community-based non-profit serving Silver Spring MD area tweens and teens."

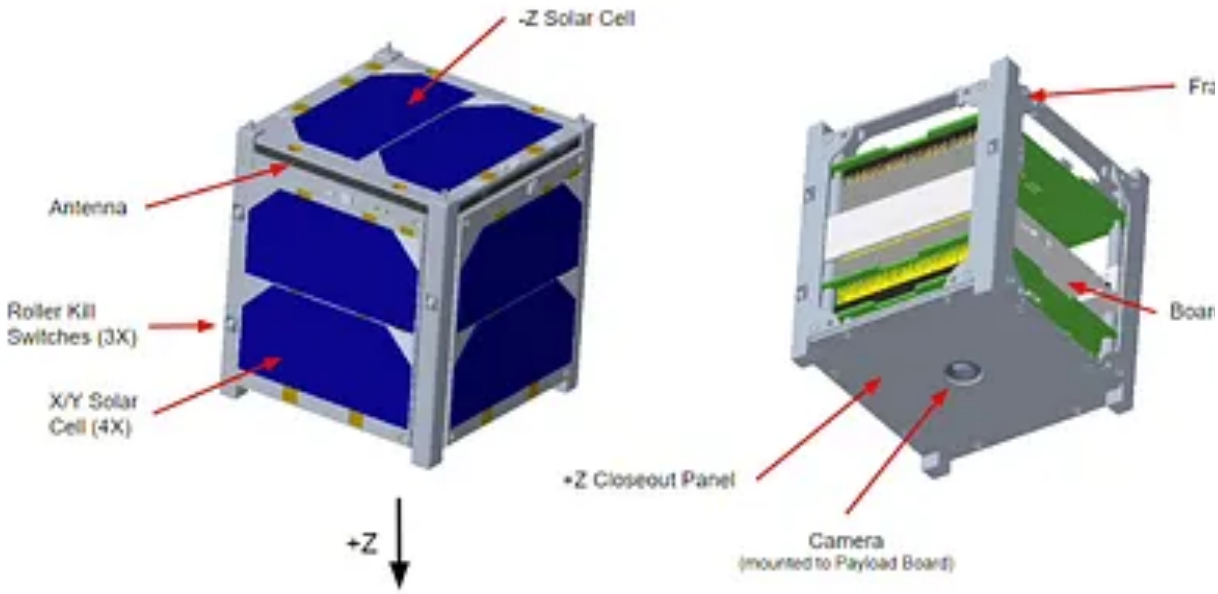

Image courtesy of Experimental Radio News / SilverSat

> The mission will demonstrate use of the Improved Layer 2 Protocol (IL2P) and Slow Scan Digital Video. The satellite will transmit data in an IP over IL2P protocol. This includes photos taken by a camera on the satellite, along with short text. The ground station forwards the data and photos to X.com, as tweets. The brain of the system is a Raspberry Pi.

In a followup email, AK4AV pointed out an additional document on the FCC website - SilverSat Satellite Technical Description (that wasn't available from SilverSat's website).

I'm just in awe at the now wide dispersement of Cubesat technology, incorporating Amateur Radio and Amateur Radio technology (such as IL2P) into organizations whose missions aren't primarily within Amateur Radio. I'll guess that there's at least some connection, or history, between SilverSat Ltd. and AMSAT (US) given that involved small satellites and both were5 based in Silver Spring, Maryland.

As always, a new issue of **Experimental Radio News** hitting my email inbox caused a "must read, right *now*" happy disruption in my day. And as usual I had to read it through a couple of times to fully grasp the distilled wisdom and perspective that AK4AV packs into every issue. There were a number of Zero Retries Interesting articles in ERN 11, including a technology that uses HF radio to predict earthquakes.

CaribouLite SDR HAT for SDR on a Raspberry Pi

Jeff Geerling KF0MYB on his blog:

> A couple years ago, after I heard about the CaribouLite on CrowdSupply, I pre-ordered one.
>
> I've dabbled in SDR with an RTL-SDR v3 for a few years, even using one with nrsc5 to listen to baseball games OTA because of silly MLB blackout restrictions.

> But low-cost SDRs like the RTL-SDR v3 are receive-only, and have a limited frequency range, and lower quality RF filtering, so it can be frustrating if you're trying to work with lower-power RF... or trying to transmit at all!
>
> So the CaribouLite's hackable FPGA, the open source firmware, and its much better frequency range (30 MHz up to 6 GHz) combined with TX capabilities to make it enticing.
>
> Well, I received my CaribouLite back in March... of 2023. And it was sitting in my 'RF' box since then. I decided to pull it out and plug it into a Pi to see how it works or if it's worth the extra $100 I spent on it over another RTL-SDR v3!

What's most impressive to me about this blog post and video isn't the content, but rather the *context*. It's instructive that Geerling6 occasionally mentions that he's a licensed Ham, but I've only seen him mention his callsign when he got licensed. Mentioning his callsign is irrelevant to *his* audience.

Geerling is an accomplished hacker and a popular YouTube tech personality. I'm continually impressed that Geerling "plays it straight" in his YouTube channel(s). He does not do clickbait headlines (well, occasionally humorous ones), he presents thoroughly researched information, he does a great job in his videos with tight editing and high production values, and he's a subject matter expert on, among other things, new developments with Raspberry Pi computers (he's on very good terms with the Raspberry Pi organizations).

Thus when *Geerling* discusses radio technology like in this video, he creates interest about radio technology within a community (Raspberry Pi fans) that would otherwise not be exposed to the subject. I think Geerling is showcasing how to expose non Amateur Radio audiences, that are highly technical, to Amateur Radio subjects. Keep it high level, but provide plenty of detailed backup material (such as Geerling does with the detailed installation instructions on his blog). Don't immediately dive deep into the radio tech, but offer ample context as to why this particular radio tech is relevant. Then blend the radio tech and the normal topic (Raspberry Pi) in the presentation. In short, he doesn't lead with the assumption that the radio technology is the most important part of the presentation… like so many of us do. When Geerling discusses radio technology, he *keeps it relevant to his audience*.

If there are Zero Retries readers in the St. Louis, Missouri area, please offer to help Geerling in any Amateur Radio projects he is interested in doing. We'll have really made some inroads if an Amateur Radio antenna appears at Geerling's new dedicated lab / studio. Contact info is at his web page.

I'll be following this blog post and video *slavishly* to get my Caribou Lite units up and running. He saved me *a lot of grief* which his recommendation of using a RPi 4 rather than a RPi 5.

Leave a comment

Share

Zero Retries Boilerplate

See the **Zero Retries Boilerplate** page for significant acknowledgements and other information relevant to Zero Retries. For new readers of Zero Retries, that page, and the **About Zero Retries** page has useful information to check out.

My ongoing ***Thanks*** to:

- **Tina Stroh KD7WSF** for, well, *everything!*
- ***Annual Founding Members* who generously support Zero Retries financially:**
  Founding Member 0000 - Steven Davidson K3FZT (Renewed 2024)

  Founding Member 0001 - Randy Smith WU2S (Renewed 2024)
  Founding Member 0002 - Chris Osburn KD7DVD (Renewed 2024)
  Founding Member 0003 - Don Rotolo N2IRZ (Renewed 2024)
  Founding Member 0004 - William Arcand W1WRA (Renewed 2024)
  Founding Member 0006 - Todd Willey KQ4FID (Renewed 2024)
  Founding Member 0007 - Merik Karman VK1DF / VK2MKZ (Renewed 2024 *with two Founding Member subscriptions!*)
  Founding Member 0008 - Prefers to Remain Anonymous 14 (Renewed 2024)
  Founding Member 0009 - Prefers to Remain Anonymous 19 (Renewed 2025)

Founding Member 0011 - Rick Prelinger W6XBE (New 2024)
Founding Member 0012 - Ryan Tolboom N2BP (New 2024)

- Numerous Annual and Monthly subscribers who also generously support Zero Retries financially!

Thanks for reading!
Steve Stroh N8GNJ / WRPS598 (He / Him / His)
These bits were handcrafted (by a mere human, not an Artificial Intelligence bot) in beautiful Bellingham (The City of Subdued Excitement), Washington, USA, and linked to the Internet via **Starlink *Satellite* Internet Access**.

2025-01-24

Blanket permission is granted for *Amateur Radio use* of any Steve Stroh content in Zero Retries for Amateur Radio newsletters and distribution via Amateur Radio such as (but not limited to) Packet Radio Networks, Packet Radio Bulletin Board Systems, Repeater Nets, etc. Specific blanket permission is granted to TAPR to use any Steve Stroh content in Zero Retries for the TAPR Packet Status Register (PSR) newsletter (I owe them from way back).

In such usage, please provide appropriate authorship credit for the content.

If you'd like to republish an article in this issue for other uses, just ask.

All excerpts from other authors or organizations, including images, are intended to be fair use. *Unless otherwise noted in the article*, there are no paid promotional items in any Zero Retries articles.

Portions Copyright © 2021, 2022, 2023, 2024, 2025 by Steven K. Stroh.

Footnotes for this Issue

To see the relevant sentence for the footnote, just click the footnote number.

1

Arguably, we have such radios now for VHF / UHF - the many Software Defined Transceivers, but those 1) have transmit power way too low for practical use, and 2) the software to use those radios (such as GNU Radio) is complicated to the point of frustration for those (like me) that want to "just pick a mode and *use* the radio".

2

In making this observation about the contributions of Canadian Amateur Radio Operators to Amateur Radio data communications, I'm not minimizing the amazing contributions to Amateur Radio technology from other countries. Two recent examples are the M17 Project (Poland) and the zBitx (India). And of course, the formation of TAPR (United States) which popularized packet radio at scale.

3

I made this remark to Martin Alcock VE6VH upon discovering the mention of V2:
If I had the technical chops… I would consider implementing "V-2" in IP400 to bring it back from the dead just for the Geek fun of it.
Especially [with me, living in Bellingham, Washington, 10 miles from the US / Canada border] being this close to Vancouver.
I'm sure there are gaps that need to be addressed in this day and age, but those VADCG folks were good, and I'll guess they didn't miss much.
https://archive.org/details/The_Packet_VADCG_Newsletter_1984-10/page/n3/mode/2up

4

The auto discovery, and the ability to link multiple co-located nodes on a "network" to do automatic routing was, in my mind, the first practical mesh networking system in Amateur Radio. I think Net/ROM's mesh networking aspect is an under-appreciated and under-used technology in Amateur Radio. Also Net/ROM's hop-by-hop acknowledgement made same frequency mesh networking actually work. Another ingenious aspect of Net/ROM was the diode matrix "networking" via a TNC's RS-232 port was ingenious, and it's amazing it worked as well as it did. If I ever find out who the creators of Net/ROM were, I'd buy them a beer and tell them how much I admired Net/ROM.

5

AMSAT's address of record has changed from Silver Spring, Maryland to Washington, DC.

6

In Zero Retries stories, I normally reference callsigns rather than names in articles, but Geerling is much better known by his name rather than callsign, thus I'm making an exception here.